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In re Application of	
Application Number: 08/821,027	Filed: Mar. 19, 1997
Art Unit	Examiner

Paper No. 28

Assistant Commissioner for Patents
Washington, DC 20231

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☐ (A) referred to in:

United States Patent Application Publication No. 6,064,653 page _____, line_____,

United States Patent Number_____, column _____, line _____, or

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United States Patent [19]

Farris

[11] Patent Number: 6,064,653

[45] Date of Patent: May 16, 2000

[54] **INTERNETWORK GATEWAY TO GATEWAY ALTERNATIVE COMMUNICATION**

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[73] Assignee: **Bell Atlantic Network Services, Inc.**, Arlington, Va.

[21] Appl. No.: **08/779,458**

[22] Filed: **Jan. 7, 1997**

[51] **Int. Cl.**[7] **H04L 12/66**

[52] **U.S. Cl.** **370/237**; 370/352

[58] **Field of Search** 370/352, 353, 370/354, 355, 356, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 468, 237, 238; 379/221, 220; 340/827

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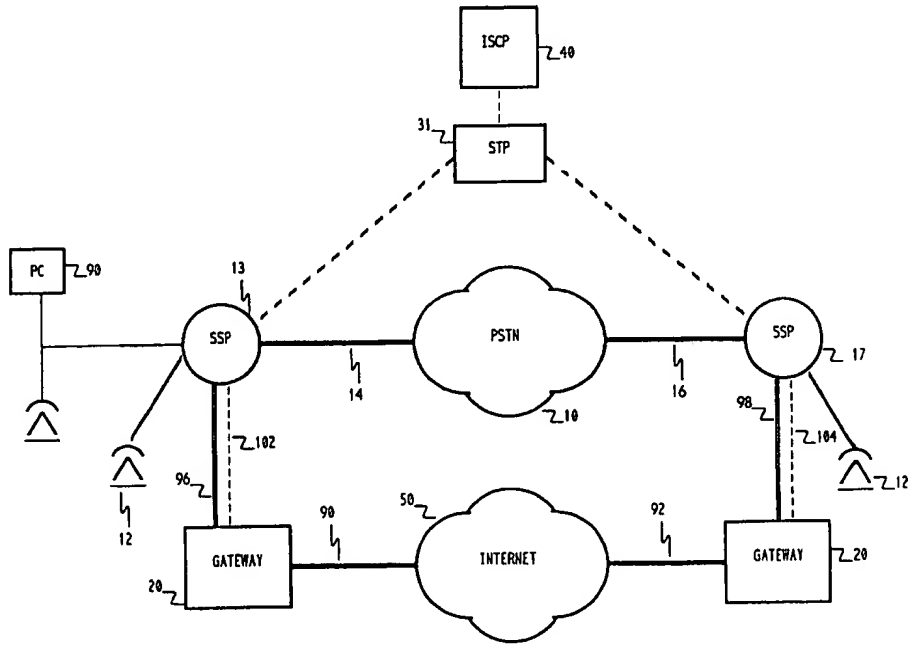
[57] **ABSTRACT**

Voice calls between two end location gateway servers of a data internetwork are diverted, during periods of unacceptable network conditions, through the public switched telephone network (PSTN). A plurality of such diverted calls may be multiplexed into a single ISDN or T1 channel, thereby permitting a sharing of the more expensive cost of PSTN routing. Incoming calls are appropriately formatted for digital transmission, including compression when applicable, by the gateway servers and multiplexed for transmission either through the data network or back through an ISDN channel or the like through the PSTN. Calls may be expeditiously re-routed back through the data internetwork when data network conditions improve.

16 Claims, 9 Drawing Sheets



INTERNETWORK GATEWAY TO GATEWAY ALTERNATIVE COMMUNICATION

RELATED APPLICATIONS

This application is related to application Ser. No. 08/822,602, filed Mar. 19, 1997 and entitled TRANSPORT OF CALLER IDENTIFICATION INFORMATION THROUGH DIVERSE COMMUNICATION NETWORKS, to application Ser. No. 08/815,361, filed and Mar. 11, 1997 and entitled PACKET DATA NETWORK VOICE CALL QUALITY MONITORING, to application Ser. No. 08/821,027, filed Mar. 19, 1997 and entitled VOICE CALL ALTERNATIVE ROUTING THROUGH PSTN AND INTERNET NETWORKS, to application Ser. No. 08/634,544, entitled UNIVERSAL ACCESS MULTIMEDIA NETWORK, filed Apr. 18, 1996, to application Ser. No. 08/634,543, entitled INTERNET TELEPHONE SERVICE, filed Apr. 18, 1996 and to application Ser. No. 08/670,908, entitled INTERNET TELEPHONE SYSTEM, filed Jun. 28, 1996. The specifications of those applications are incorporated herein by reference in their entirety.

TECHNICAL FIELD

The present invention relates to telecommunications networks and more particularly to alternative routing of voice calls placed through a data internetwork.

BACKGROUND OF THE INVENTION

As provision of voice telephone services on a world wide basis progresses, an expanding variety of networks are being utilized to handle the high volume of traffic throughput. The recent development of data network capability, such as the Internet, for voice call communication offers advantages that are now being explored. The Internet was initially intended to accommodate transmission of data, not necessarily on a real time basis. Acclimation of such data networks to the stringent voice transmission requirements of real time, high quality communication presents developmental challenges.

The emergence of Integrated Services Digital Network (ISDN) technology has enabled local area networks to be interconnected with each other to form a wider area network and to enable a local area network to be accessed by a remote personal computer and operated as if the computer were resident on the network. ISDN has integrated computer and communications technologies to provide, worldwide, a common, all-digital network. By virtue of a standardized structure of digital protocols, implementation of multiple networks within national boundaries, appears to a user as a single, uniformly accessible, worldwide network capable of handling a broad range of telephone, data and other conventional and enhanced services.

ISDN is configured for carrying both voice and data communication. Within the framework of ISDN, the network provides services and the user accesses the services through the user-network interface. A "channel" represents a specified portion of the information carrying capacity of an interface. Channels are classified by two types, Basic Rate ISDN (BRI) and Primary Rate ISDN (PRI). BRI delivers two B-channels, each having a capacity of 64 Kbps, capable of transmitting voice and data simultaneously. A 16 Kbps D-channel transmits call control messages and user packet data. PRI provides twenty three B-channels of 64 Kbps capacity each for carrying voice, circuit switched data or packet data. The D-channel is a 64 Kbps signaling channel. The B and D channels are logically multiplexed together.

Particular description of conventional ISDN interfaces at the customer premises, the local loop at the carrier end and exchange switching equipment is not believed necessary to the present disclosure. Details of such architecture may be found in ISDN: An Overview, Data Pro Research, Concepts & Technologies, MT 20-365; pp 101–110, published by McGraw Hill, Incorporated (December 1988).

The Internet basically comprises several large computer networks joined together over high-speed data links ranging from ISDN to T1, T3, FDDI, SONET, SMDS, OT1, etc. The most prominent of these national nets are MILNET (Military Network), NSFNET (National Science Foundation NETwork), and CREN (Corporation for Research and Educational Networking). Network standards, conventions and protocols have evolved for interconnecting networks and routing information in an orderly manner. These protocols, commonly referred to as TCP/IP (Transport Control Protocol/Internet Protocol), have become widely used in the industry. TCP/IP is flexible and robust. In effect, TCP takes care of the integrity and IP moves the data. Internet provides two broad types of data services: connectionless packet delivery service and reliable stream transport service. To accommodate telephone service for usage by ordinary analog telephone sets, analog voice signals are converted to appropriate data format for transmission through data networks and then reconverted to analog before being received at the destination.

A simplified diagram of the Internet is depicted in FIG. **1**. The Internet **50** comprises Autonomous Systems (AS) which may be owned and operated by Internet Service Providers (ISPs) such as PSI, UUNET, MCI, SPRINT, etc. Three such AS/ISPs are shown in FIG. **1** at **52**, **54** and **56**. The Autonomous Systems are linked by Inter-AS Connections **58**, **60** and **62**. Information Providers (IPs) **64** and **66**, such as America Online (AOL) and Compuserve, are connected to the Internet via high speed lines **68** and **70**, such as T1/T3 and the like. Information Providers generally do not have their own Internet based Autonomous Systems but have or use Dial-Up Networks such as SprintNet (X.25), DATAPAC and TYMNET.

Other information providers, such as universities, are indicated in exemplary fashion at **72** and are connected to the AS/ISPs via the same type connections, here illustrated as T1 lines **74**. Corporate Local Area Networks (LANs), such as those illustrated at **76** and **78**, are connected to the Internet through routers **80** and **82** and links shown as T1 lines **84** and **86**. Laptop or PC computers **88** and **90** are representative of computers connected to the Internet via the public switched telephone network (PSTN), shown connected to the AS/ISPs via dial up links **92** and **96**.

The Information Providers (IPs) are end systems that collect and market the information through their own servers. Access providers are companies such as UUNET, PSI, MCI and SPRINT which transport the information. Such companies market the usage of their networks.

In simplified fashion the Internet may be viewed as a series of gateway routers connected together with computers connected to the routers. In the addressing scheme of the Internet an address comprises four numbers separated by dots. An example would be 164.109.211.237. Each machine on the Internet has a unique number that includes one of these four numbers. In the address, the leftmost number is the highest number. By analogy this would correspond to the ZIP code in a mailing address. The first two numbers that constitute this portion of the address may indicate a network or a locale. That network is connected to the last router in the